Answer eight questions. Give all operations (except mental ones) necessary to find results. Reduce each result to its simplest form and mark it 'Ans.'

1. Divide \( x^4 - 12x^3 + 53x + 21 \) by \( x - 3 \) to four terms and find the remainder, using the synthetic method.

2. In how many ways can a selection of 5 books be made from 14 books, when one specified book is always included?

3. Revert to four terms the series, \( y = 2x + x^2 - 2x^3 - 3x^4 + \ldots \).

4. By the method of undetermined coefficients expand to four terms \( \frac{2 - 3x - x^2}{1 - 2x + 3x^2} \) in ascending powers of \( x \).

5. By Horner's method of approximation find to three places of decimals the cube root of 10.

6. By the method of determinants solve \[ \begin{align*} 2x + 4y - z &= 7 \\ 4x - 3y + 2z &= 4 \\ x + y - z &= 0 \end{align*} \]

7. Form the equation of the fourth degree with rational coefficients, three of whose roots are \( +3, -3, +\sqrt{-13} \).

8. Plot the graph of the equation \( y^2 = 4x + 4 \).

9. Given \( 3^x = 2 \); find the value of \( x \) in terms of \( \log 2 \) and \( \log 3 \).

10. Find the multiple roots of the equation

\[ x^6 - 3x^4 - 2x^3 + 6x^2 + x - 3 = 0 \]

11. Find three numbers in geometric progression such that their sum shall be 104 and the last shall exceed the first by 64.

12. Transform the equation \( x^4 - 7x^2 + 6x = 0 \) into an equation each of whose roots is less by 4 than the roots of the given equation.